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The Papers read were—

1. *Notes on a Map of the United States and the adjacent Countries.*  
By HENRY V. POOR, Esq., of New York.

THE best route of commerce across the continent seems to be indicated by the direction in which its great rivers run. The St. Lawrence, running very nearly east, carries a navigable water line into the heart of the continent, a distance of 2500 miles from the Atlantic Ocean. The Upper Missouri, very nearly upon the same parallel with Lake Superior, runs almost due east for 600 or 700 miles, after issuing from the Rocky Mountains. The waters of this river interlock with those of the Columbia, the great river of the Pacific slope of the continent. The directions of these great rivers indicate a deep depression in the continent, extending from ocean to ocean, and a favourable route for a great highway to connect them.

But upon going north, we find a much lower depression than that occupied by the valley of the Missouri River. Lake Winnipeg is only slightly elevated above Lake Superior; the surface of the latter being about 590 feet above the sea, while that of the former is about 850 feet. The rivers that flow into this lake from the south and west have very gentle and uniform currents. The Red River of the North has an inclination of only two or three inches to the mile, and is navigable nearly to its source, by large class steamboats, at all periods of the year when not obstructed by ice. The Saskatchewan, which flows from the west, is one of the great rivers of the continent. Near its entrance into the lake it is for a short distance obstructed by rapids. From the head of these to the Rocky Mountains there is no obstruction to the navigation of the river. The valley through which it runs is depressed from 1000 to 1200 feet lower than that occupied by the Missouri River upon similar meridians. At the mouth of the Yellow Stone River,  $102\frac{1}{2}^{\circ}$  west from Greenwich, the surface of the Missouri River is about 2180 feet above the level of the sea. Fort Cumberland, on the Saskatchewan, and very nearly on the same meridian, is only about 900 feet above the sea. Both rivers have, probably, very nearly the same rate of fall. The eastern slope of the Rocky Mountains at the source of the Saskatchewan is, consequently, much more depressed than at the source of the Missouri. This fact would indicate, that after leaving Lake Superior, the best route for a railroad across the continent deflects, northerly, into the basin of Lake Winnipeg and its tributaries, assuming that the mountains can be passed at the head of the Saskatchewan as well as at the head of the Missouri River.

This northern inclination of the route I consider of no solid objection on the score of climate. Only a small amount of snow falls during the winter season—not enough probably to create any inconvenience to the running of railway trains. On going west, the climate becomes much milder. The same law in regard to climate prevails in the western as the eastern hemisphere. It has been well ascertained that the climate of the eastern coast of Asia corresponds almost exactly with that of America, while the climate of the western coast of America is equally mild with that of the western coast of Europe. The isothermal line, after leaving Lake Superior, runs in a north-westerly direction, entirely through the British Possessions, and shows that a large portion of the territory drained into Lake Winnipeg possesses as favourable a climate as some of the best portions of Canada or the United States. In fact the Hudson Bay Company have in possession an area of country equal to six or eight first class American States, admirably adapted to agriculture, with a genial and attractive climate. There is no portion of the United States that will, in a very short time, possess better facilities for commerce. As already stated, the Red River of the north, running into Lake Winnipeg, and interlocking with the head waters of the Mississippi, is navigable nearly to its source, for large class steamboats. To this river a railroad is already in process of construction from St. Paul, an important town at the head of navigation on the Mississippi River. A railroad will, before long, be constructed from the head of Lake Superior to the same point. The distance for which this river is navigable is something over 500 miles. Lake Winnipeg extends in a northerly and southerly direction, nearly, if not quite, 400 miles. Its length is equal to that of Lake Michigan, one of the largest of the great American lakes. With the exception of some rapids near its mouth, the Saskatchewan is navigable to the Rocky Mountains. In a few years more the improvements described will render this territory as accessible to emigrants as any portion of North America. It is therefore of the greatest importance that it should be thrown open to settlement, as an act of humanity to the emigrant, who will soon be unable to procure cheap homes either in the United States or Canada, and as a means of increasing the number of inhabitants in the colonial possessions of Great Britain, and thereby its commerce and trade.

In causing the map (now exhibited) to be drawn, my object was to present at a glance, the geographical and topographical features of the United States, together with its political subdivisions, and its public works. In the topographical features of the United States and Canada there are several great divisions that differ exceedingly

from each other. The western portion of the continent delineated, is occupied by several mountain ranges rising from an immense plateau, extending nearly one third of the way across the continent from east to west. On some parts of this plateau, the width of these mountain ranges is nearly 1000 miles. The great plateau on which they stand begins to rise from the Mississippi and Missouri Rivers. At first the ascent is gradual, but after going west about 500 miles from the valley of the Mississippi River, the rate of ascent of that portion of it drained by the Red Arkansas, Platte, Kansas, and Niobrarah, increases to about 8 feet to the mile, till an elevation is reached of from 7000 to 8000 feet above the sea. The western slope of this plateau, and of the mountains which crown it, is, on the other hand, very abrupt—the mountains rising in some cases to an altitude of 13,000 feet in a distance of 100 or 150 miles from the Pacific coast. Between the summits of the Rocky Mountains on the eastern slope of the plateau, and the Sierra Nevada lying on the western, is an immense elevated, arid, and desert plain, having an independent system of lakes (salt), and rivers, similar to the systems of the Dead and Caspian Seas.

The easterly slopes of the plateau of the Rocky Mountains partake largely of the character of the plateau itself, being arid and sterile, till the meridian of 99 or 100 west from Greenwich is reached. In the United States, with the exception of the head waters of the Missouri, only a small, if any portion of the territory between the meridians named, and the summits of the Sierra Nevada, can be cultivated without irrigation; a fact which is only imperfectly understood even by the people of the United States. After the Sierra Nevada is crossed, there is a narrow belt of fertile and well watered country occupied by the states of California and Oregon and the territory of Washington.

The next grand division shown on the map is that occupied by the Mississippi River. This presents features entirely dissimilar to the division just described. It is characterised by the uniformity of the surfaces and inclinations of its great plains, their slight elevation above the sea-level, and the fertility of their soil. The surface of the Mississippi River at the mouth of the Ohio, 1200 miles from the Gulf of Mexico, is only 275 feet above the level of the sea. Above the mouth of the Ohio, the rate of fall is more rapid, yet still very uniform. At the mouth of the Minnesota River, 2192 miles from the Gulf, the elevation of the Mississippi is only 744 feet above tide. The rate of fall from this point to the sea is about 4 inches to the mile. The Mississippi River, though much inferior to the Missouri in length, and in the area of the

country it drains, occupies a much lower level. The dividing line between the Minesota, a branch of the Mississippi, and the Red River of the north, running into Lake Winnipeg, is less than 1000 feet above the sea. The Missouri River, draining the eastern slopes of the great Rocky Mountain ranges, occupies a much higher plane. At the mouth of the Yellow Stone, about 3260 miles from the sea, its elevation is about 2180 feet. At the foot of the Grand Falls of the Missouri, 3960 miles from the sea, the elevation of the surface of the river is about 2600 feet above tide. The Missouri at its mouth is about 380 feet above tide. The distance from this point to the Grand Falls is about 2570 miles. The river falls, consequently, in this distance about 2220 feet, or at the rate of a little more than 10 inches to the mile. The rate of descent is remarkably uniform ; —the lower portion of the river being, probably, the most rapid. Steamboats can run from the Gulf of Mexico to the Grand Falls, a distance of 3960 miles.

It is to the gentle descent of its great rivers, and the ease with which communications can be effected between them, that the United States owe their remarkable facilities for an internal commerce. Lake Superior, the source of the St. Lawrence River, is elevated about 590 feet above the sea. This elevation is distributed over a distance of 2500 miles, the greater portion of the descent being grouped at two points, the falls of Niagara, at the outlet of Lake Erie, and the falls of the St. Lawrence, at the outlet of Lake Ontario. By means of canals this magnificent watercourse is rendered navigable for its entire length. A vessel of large class may now clear from the head of Lake Superior, in the very heart of the continent, for Liverpool or London. A steamer may leave the same point, passing through the Straits of Belle-Isle, the Atlantic Ocean, to the Gulf of Mexico, and up the Mississippi to within *one hundred* miles from the point from which it started, after having made a voyage of nearly 8000 miles. These facilities for commerce give value to the produce and the lands in the interior of the continent, without which they would be valueless. Produce can now be taken from Chicago to New York by water, a distance of 1500 miles, for seven or eight dollars per ton. Owing to the smaller quantity of freight going West, the charge for heavy articles in this direction is only about five dollars per ton. The charges for transportation on the Mississippi River from St. Paul, and from Pittsburgh, at the head of navigation on the Ohio, both more than 2000 miles from the Gulf of Mexico, are at very nearly the same rates.

In speaking of the great interior basin of North America, a portion

of it occupied by the Great Lakes is necessarily embraced. The dividing line between the waters running into the lake, and those running into the Mississippi, is for a long distance imperceptible—the country drained by each presenting similar aspects and structure. The highest point on the line of the Illinois Canal, between Lake Michigan and the Illinois River, a tributary of the Mississippi, is only *eight* feet above the level of the lake: in other words, a cut of ten feet in depth, for not a great distance, would turn a portion of the waters of Lake Michigan into the Mississippi—so nicely poised in the centre of the continent are these great Inland Seas. It seems not unlikely that the ocean once flowed through the valleys of the Mississippi and St. Lawrence, forming an island of that portion of the United States occupied by the Alleghany, and its connecting ranges of mountains.

The third grand division of the continent shown on the map is that drained by the St. Lawrence and its tributaries. Although upon the south shores of Lakes Michigan and Erie there is nothing to mark the dividing line between the great division already described and the one now under discussion, as we go north and east the boundaries between the two become well defined. The summits between Lake Superior and the Mississippi are elevated all the way from 500 to 800 feet above the lake, except in one instance, at the head of the St. Croix River, where there is a break, the lowest point of which is only 366 feet above the lake. On leaving the south shore of Lake Michigan and going east, the surface of the country gradually rises, till it attains, in the State of New York, an elevation of nearly 1700 feet above the sea. This plateau, both in the States of New York and Pennsylvania, falls off abruptly into the basin of Lake Erie, in a distance, in many cases, of six or eight miles. The head waters of the Ohio, the great eastern tributary of the Mississippi, rise within a few miles of this lake. In fact, all the great lakes have only a very limited area of drainage on their southerly shores. It is not till Lake Ontario is reached that the St. Lawrence basin becomes well marked. As the waters of Lake Michigan could, without great expense, be turned into the Gulf of Mexico, so could the waters of Lake Erie be conducted into the harbour of New York. The great plateau of the Alleghanies, a short distance from the outlet of Lake Erie, suddenly falls off into the basin of Lake Ontario. At the dividing line between the waters flowing into this lake and the Hudson River, it is depressed 145 feet *below* the surface of Lake Erie. It is through this great defile or depression in the continent, that the Erie Canal is constructed. The long level on this canal, which corresponds to

the crest of the Great Alleghany range, is 69 miles long. This canal is the eastern outlet for the great interior basin of the country, as is the Mississippi River of the southern. On going still farther northeast, another remarkable depression occurs in the general surface of the country, being that occupied by Lake Champlain. This lake is elevated only 87 feet above the level of the sea. Easterly of this depression, which extends all the way from the St. Lawrence River to the Hudson, the dividing line between the St. Lawrence and the rivers flowing into the Atlantic Ocean is a well defined and comparatively lofty mountain range.

The last grand division shown on the map is the Atlantic slope of the Alleghany mountain ranges. This is comparatively insignificant in extent, though at present the principal seat of the population of the United States, and of its leading commercial and agricultural communities. It extends from the Gulf of St. Lawrence to the Gulf of Mexico, embracing the two lower British North American Provinces. It has an average breadth of about 350 miles. This division is composed of belts of country very dissimilar in their aspects. With the exception of the New England States and the Provinces named, that portion of it lying immediately upon the sea-coast is low and marshy. The width of this belt varies all the way from 10 to 50 miles. This is succeeded by a more elevated, though comparatively depressed and level belt, composed of sandy plains, covered with pine forests. The slopes of the plateau from which rise the Alleghany Mountains are next reached, and with them, the most fertile portions of the Eastern States. The general elevation of this plateau is about 2000 feet above the sea. Upon this, the mountains rise to an elevation, in some cases, of over 6000 feet above the sea. The breadth of the Alleghany range of mountains will average from 200 to 300 miles. For the greater part of their height they are composed of several parallel ranges, having the general direction of the Atlantic coast.

As I did not expect to be called upon to make any remarks, such as I have made have necessarily been somewhat discursive, and totally inadequate to so broad a subject as the topography of the United States. The map now exhibited will supply the want of greater detail on my part. I have only attempted a brief outline. The map is based on the coast survey of the United States, conducted by Professor A. D. Bache, whose eminent scientific attainments, I am happy to know, are properly appreciated by your learned Society. The interior is compiled from the surveys of public lands of the United States, and the surveys of several proposed routes for railways across the continent, and surveys conducted

by the several States. It also shows 26,000 miles of railway in operation in the United States, and nearly 3000 in Canada, and some 8000 or 10,000 more in process of construction, and about 6000 miles of canals.

The PRESIDENT.—I need not say that we are very much obliged to Mr. Poor for his very lucid explanation of this large and valuable map. When he tells the geographers, who have just adjudicated their gold medal of the year to his distinguished countryman, Professor Bache, that this map is founded in great part on the coast survey, we know what value is to be attached to it.

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2. *Notes on Borneo.* By Lieut. C. A. C. DE CRESPIGNY, R.N., F.R.G.S.\*

A. *Ascent of the River Limbong.*

Labuan, Sept. 7, 1857.

DEAR DR. SHAW,—I enclose you a map or plan of the Limbong River, for the information of the Royal Geographical Society. May I beg you to send a copy to the Admiralty, as my time runs so short that I shall not be able to make one.

With regard to the Limbong, but little can be said of interest. I ascended it in preference to any other river, because it runs through a less elevated country than the others in the neighbourhood, and therefore its ascent at this time of year would be comparatively more easy, and because the late irruption of Kyans into the country about its upper parts created a desire to inspect the scene of their devastation.

I found the country on either side of this fine stream thinly peopled, and the inhabitants very poor. In the upper villages, among the Bisayans, the people lived, in addition to their rice, upon wild hogs and snails, principally the latter. The Malays near the mouth of the river, and for 50 miles up, cultivate rice and sago, but not much, for fear of becoming rich, when they would fall the prey of one of the numerous Bruni pangerans (feudal chieftains). The formation of the country appears to be sandstone, slate, clay containing iron, blue clay, fine loam, and decayed vegetable matter. I passed two rapids, the lower running over large pebbles of sandstone; the upper, sand and snags. I passed also the ruins of two villages destroyed by the Kyans, who, in number 3000, had taken 100 heads, and two others deserted by the inhabitants, who had moved lower down the river. In front of one of these was a rude wooden statue in honour of taking a Murut chief. I arrived

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\* See Proceedings, Royal Geographical Society, vol. i. p. 205, &c.—Ed.